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Optical Encryption and Decryption in Security-volume Holograms

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Abstract

An optical security holographic memory encrypted by a random phase key and decrypted by a holographic key (a holographic optical element; HOE) is presented and demonstrated. The security hologram is based on protecting the access to the memory from the unauthorized users by encoding the reference waves. The holographic decryption key is fabricated by storing the wavefront information of the set of reference beams. Each addressed reference beam is stored in the HOE through holographic multiplexing technique. The decryption process is achieved by using the reconstruction reference beam to access the secure data. This security hologram system is suitable for practical application since the decryption key can be controlled copied. As to our best knowledge, this is the first experimental impementation to replace a random phase mask key.